

A decade of experience with deep brain stimulation for patients with refractory medial temporal lobe epilepsy

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Introduction

Over the last decade, deep brain stimulation (DBS) has emerged as a possible therapy for refractory epilepsy patients. Different intracerebral targets have been targeted, including remote network structures (e.g. the anterior thalamic nucleus, the centromedian thalamic nucleus, the subthalamic nucleus, the caudate nucleus and the cerebellum) and the ictal onset zone. The latter can be approached by either continuous or responsive stimulation. In this abstract we present our long-term results with continuous mesial temporal lobe (MTL) DBS for MTL epilepsy.

Methods

Since 2001, 11 patients with refractory MTL complex partial seizures with or without secondary generalisation underwent uni-or bilateral MTL DBS depending on seizure onset localisation as determined by invasive video-EEG monitoring. When unilateral MTL DBS failed to decrease seizures with >90% after 3 years of stimulation, a switch to bilateral MTL DBS was proposed.

Results

After a mean follow-up of 8.5 years, 3/11 patients are seizure free for > 36 months. 3/11 patient have a ≥ 90 % reduction in seizure frequency; 2/11 patients have a reduction in seizure frequency of 50-90 %; 1/11 patient has a reduction in seizure frequency of 30-50%; two patients are considered non-responders. Patients with a focal unilateral ictal onset (4/11), all of them experiencing a > 90% seizure frequency reduction, responded better than those with a regional unilateral (5/11) or bilateral ictal onset (2/11). None of the patients reported permanent symptomatic side effects.

Regarding the chronic stimulation protocol, 4 relevant assessments were made. 1) Augmenting output voltage mostly did not affect seizure frequency, but in three cases it did. 2) In 5/6 patients in whom unilateral DBS failed to decrease seizure frequency with >90% after 2.5 to 3 years, bilateral DBS was started resulting in improved seizure control in 3/5 patients (> 90% reduction or seizure free). 3) In 4/5 patients in whom day-night cycling (DBS off between 0 and 6 am) was introduced after a stable frequency reduction had been reached, this did not affect seizure frequency. 4) In 7 patients, DBS was switched off during at least a month. This was associated with an immediate or delayed increased seizure frequency in 4/7 patients, did not affect seizure frequency in 2/7 patients and coincided with seizure freedom in 1/7 patient.

Discussion

This open study with an extended long-term follow-up demonstrates maintained efficacy of DBS in MTL structures for patients with refractory medial temporal lobe epilepsy. In >50% of patients, a seizure frequency reduction of at least 90% has been reached. Patients with unilateral focal ictal onset seem to respond best. After failure of unilateral DBS, bilateral stimulation can improve results and therefore should be considered. Weaknesses of this study include the open study design and – although until today no larger patient series has been published – the small number of patients.

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